

vailed over New Mexico, Arizona, and southern California during the three-month period under consideration. The association between low barometric pressure and excessive rains in the Southwest² and high barometric pressure and unusual cold in the North² and East² has also been established. It has been observed, in fact, that during winters of excessive cold in the northern and eastern districts of the United States the seasons have been unusually wet from western Texas to southern California.

During the past winter the associated conditions referred to have prevailed, and they have resulted in frequent and generally excessive rains not alone in southern California but in all of the immense territory that extends thence eastward to Texas.

It is, therefore, apparent that the rainfall which was supposed to have been caused by the liberation of a few chemicals of infinitesimal power was simply the result of general atmospheric conditions that prevailed over a large area. It is hoped that the people of southern California will not be misled in this matter and give undue importance to experiments that doubtless have no value. The processes which operate to produce rain over large areas are of such magnitude that the effects upon them of the puny efforts of man are inappreciable.

Very truly yours,

(Signed)

WILLIS L. MOORE,
Chief U. S. Weather Bureau.

WIND VELOCITIES FOR DIFFERENT ALTITUDES AND EXPOSURES.

By ALEXANDER J. MITCHELL, Section Director, Jacksonville, Fla.

On August 1, 1902, the Weather Bureau office in Jacksonville was removed from the Astor Building to the Dyal-Upchurch Building. As a result, there was a change in the elevation of the anemometer cups amounting to 45 feet.

The mean hourly wind movement for the several months shows that the increase in elevation of nearly half a hundred feet results in an increase of wind velocity averaging about two miles per hour based on data for the two years ending July, 1904, as compared with the previous two years, 1900-1901 and 1902, before the removal of the office from the Astor Building. See Tables 1 and 2. Of course, these data have no conclusive value, being for only a limited time.

It is believed, however, that data for five years will show as great, or greater, hourly value as that now indicated. Certainly more verifying velocities have occurred and less pronounced pressure gradients give higher wind velocities than was the case at the old location.

In connection with wind velocity varying with the elevation of the anemometer cups as a result of better circulation and more freedom from obstructions, the average hourly velocities for the lustrum 1875-1879, with an elevation of 23 feet, the office being at the National Hall Building, and the lustrum 1897-1901, elevation 84 feet, when the office was at the Astor Building, are shown in Tables 3 and 4. In this case, with a difference in elevation of the anemometer cups amounting to 61 feet, the average difference per hour was only one mile.

Assuming that data for the lustrums used are reasonably correct and that during the period considered average weather conditions prevailed, it would appear that an increase in elevation of anemometer cups of 50 to 60 feet results in an increase of approximately one mile per hour in the lower circulation at this station.

²That is, the southwest, the north, and the east portions of the United States.—ED.

TABLE 1.—Astor Building. Average hourly velocity, years 1901-2. Elevation of anemometer cups, 84 feet above the ground.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1900	8	7	9	10	9	7	7	6	7	7	6	7
1901	7	9	9	7	7	8	7	7	9	8	7	8
1902												

TABLE 2.—Dyal-Upchurch Building. Average hourly velocity, years 1902-3. Elevation of anemometer cups, 129 feet above the ground.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1902								9	9	10	9	9
1903	10	12	10	11	10	9	8	8	11	9	10	
1904	11	10	10	11	9	10	9					

TABLE 3.—Average hourly velocity for the lustrum 1875 to 1879. Elevation of anemometer cups, 23 feet. National Hall Building.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1875	6	7	8	8	8	6	7	6	7	6	7	6
1876	6	7	8	8	8	6	7	6	7	6	7	6
1877	5	7	8	8	8	7	7	6	6	8	7	7
1878	7	8	8	8	8	6	6	6	6	6	6	6
1879	6	7	6	8	7	6	6	6	7	8	6	6
Average	6	7	7	7	7	7	7	6	7	7	6	6

TABLE 4.—Average hourly velocity for the lustrum 1897 to 1901. Elevation of anemometer cups, 84 feet. Astor Building.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1897	7	8	9	8	7	7	7	6	8	7	7	6
1898	7	7	8	8	7	7	7	8	8	8	8	8
1899	8	8	8	8	7	7	7	7	7	7	8	8
1900	7	7	8	8	7	7	7	6	7	7	6	7
1901	8	8	9	10	7	7	7	7	9	8	7	8
Average	7	8	8	9	7	7	7	7	8	8	7	7

TORNADOES OF MARCH 17, 1905, IN WESTERN OKLAHOMA.

By C. M. STRONG, Observer, Oklahoma, Okla.

The morning weather map of March 17, 1905, showed a storm of considerable energy, central over Utah, which was causing cloudy weather, showers, southerly winds, and higher temperature over the western Plateau region and the central western valleys.

This storm moved slowly eastward and was central over Colorado by the morning of the 18th.

During the afternoon of the 17th tornadoes and hailstorms developed over western Oklahoma, causing destructive effects over Roger Mills, Kingfisher, and Garfield counties. The storms were noted over Roger Mills County about 4 p. m., and over Kingfisher and Garfield counties about 5 to 6 p. m., ninetieth meridian time.

Sixteen persons were injured and two dwellings destroyed at Poarch, Roger Mills County, and three persons and one dwelling at Garber, Garfield County.

Following are the reports received concerning the several tornadoes:

Poarch, U. N. Waldrup, Postmaster.—Funnel-shaped cloud formed 4 p. m., central time, moved northeast with slight whirling motion from right to left, accompanied by heavy rain, hail, and lightning; length of path, five miles, width, one-half mile; sixteen persons injured, two dwellings destroyed.

Bison, Postmaster.—Funnel-shaped cloud at 5 p. m., central time, moved northeast with a right to left motion, accompanied by heavy rain and lightning; path observed about eight miles long, width, 50 feet; two outbuildings destroyed; two distinct tornadoes formed, one to southwest, the other to northeast of Bison, both traveling northeast.

Garber, B. A. Garber, Postmaster.—Funnel-shaped cloud at 6 p. m., central time, moved northeast with left to right motion, trees falling to west on north side, and east on south side, in center of path following direction of storm; accompanied by heavy rains, hail, and lightning, and a loud roar; cloud black; length of path two miles, width, two hundred yards; Mrs. B. Shawver and three children injured, and the Shawver house and outbuildings destroyed, total loss, \$1500.

SOME TEMPERATURES TAKEN ON LAKES HURON AND SUPERIOR IN JULY AND AUGUST OF 1904.

By F. L. ODENBACH, S. J., Director, Cleveland Observatory. Dated April 15, 1905.

From July 19 to 25, 1904, I passed over the Lakes from Cleveland to Duluth. To while away the time I occasionally took some temperatures both of the atmosphere and the water. Finding that these observations proved very interesting to the hydrographer at Duluth, more were taken on the return trip from August 2 to 7. Though not numerous, some of them are interesting and may, as has often been the case, serve to confirm some well conceived theory, or to discourage one which has been too daringly advanced.

The weather during the trip from Cleveland to Duluth was fair, with the one exception of a thunderstorm on Lake St. Clair and Saginaw Bay, which will account for the low temperature of the air at that point. The wind during both passages was light, except on August 2, at night, when we experienced a pretty stiff breeze from the east. On July 24, from 10 to 11 a. m., we observed a mirage above the hills south of Marquette. The temperatures here given were taken on the shady side of the ship. Water was drawn up the side in a tin can, the thermometer read three or four times within five minutes, the instrument then dried and the temperature of the atmosphere taken with the same thermometer.

The temperature of the water in the tin can was observed to remain steady for about ten minutes, or so long as the tin remained wet on the outside; when dry it began to rise slowly.

The very low temperature of 39.2° off Stannard Rock is very remarkable. I was so surprised that I dipped water two or three times and called on the captain to take a reading in order to be certain that I was not deceived. The night was bitter cold and the sky as clear as I have ever seen it.

FROM CLEVELAND TO DULUTH.

Date.	Water.	Atmosphere.	Location.
	°	°	
July 22, 10 a. m.	63.5	61.5	Off Saginaw Bay.
7 p. m.	62.6	61.7	Off Middle Island.
July 23, 7 a. m.	60.8	57.2	Mud Lake.
8 p. m.	55.4	50.0	Off Vermillion Point.
July 24, 7 a. m.	39.2	44.6	Off Stannard Light.
July 25, 7 a. m.	51.8	57.2	Outer Island.
noon	62.4	64.4	
3 p. m.	63.8	68.0	
5 p. m.	55.2	67.6	Bark Bay.

FROM DULUTH TO CLEVELAND.

Date.	Water.	Atmosphere.	Location.
	°	°	
August 2, 11 a. m.	64.6	70.1	Two miles east of Duluth.
2 p. m.	62.2	64.4	
3 p. m.	63.6	68.0	
5 p. m.	55.0	67.6	
8 p. m.	54.5	62.0	Sand Island.
9 p. m.	50.0	56.6	
11 p. m.	51.8	
August 3, 7 a. m.	48.2	50.0	Off Fourteen-mile Point.
10 a. m.	51.8	59.0	Five miles west of Portage Canal.
10.30 a. m.	58.8	65.3	Mouth of canal.
noon	63.5	76.1	Pilgrim Point buoy.
2 p. m.	55.4	70.7	East end of canal.
5 p. m.	57.2	62.2	Huron Island.
8 p. m.	57.2	62.6	Off Stannard Rock.
midnight	48.2	Grand Island.
August 4, 6 a. m.	44.6	55.8	Fifteen miles off Grand Marais.
1 p. m.	56.3	67.2	Whitefish Point.

The course sailed was by way of Detour Channel. From St. Marys River NW. $\frac{1}{2}$ N. to Whitefish Point; then W. $\frac{1}{2}$ N. for

Huron Island, thence W. $\frac{5}{8}$ S. for Portage River; from west end of river W. $\frac{1}{2}$ S. to Devils Island; then SW. $\frac{1}{4}$ W. to Duluth. With the fair weather we were making seventeen knots per hour.

The return was made over the same course.

A COLD WEATHER DUST WHIRL.

By F. W. PROCTOR, Fairhaven, Mass., dated March 13, 1905.

On the morning of March 13, 1905, just before 11 o'clock, the writer observed an interesting dust whirl that had generated over frozen ground. It seems to be worth reporting, in view of the tendency among meteorologists to exclude convection as a factor in the large whirls of the winter half of the year.

The sky was clear, the wind nearly calm as shown by the rising smoke columns from chimneys, though there was a gentle movement of the air from the southwest, the barometer high, and the shade temperature fifteen minutes later was 31.5° F., as shown by a sling thermometer.

The whirl formed over or near a macadamized highway. It was first noticed by reason of the rustling of the branches of some roadside trees, and since it did not die out or move away within about a minute, it was thereafter timed by the watch. By moving along the highway a little, it was possible to approach the center of the whirl, and the horizontal wind there was estimated at twelve miles an hour. Owing to the scarcity of loose litter on the fields and gardens nearby, it was not possible to observe the vertical velocity of the air currents, and the entire diameter of the whirl. But at the expiration of five minutes, the inflowing wind could plainly be perceived when the center was shown by small pieces of whirling debris to be about 100 feet away.

Fortunately just then a triangular piece of newspaper about 12 by 18 inches was picked up by the whirl, and could be watched continuously during the next five minutes. The paper rose slowly, without regular gyration, to a height estimated at 500 feet or more, drifted slowly toward the northeast, and finally disappeared without falling, so far as could be observed.

Thus, the whirl endured at least eleven minutes, and probably considerably longer.

The preceding night was cold enough to freeze the ground, and the morning insolation must have been mainly used up in softening the surface. Under these conditions, with the air temperature at 31.5° F., there could not have been much heating of the lower air layers except over the highway, which was drier than the adjacent lands, and would become heated more easily.

Apparently the whirl formed over the highway, but it soon moved off; and it would seem that its further activity must have been due in large part, to cooling aloft.

NOTE ON THE WINDS OF THE REGION ADJACENT TO THE GULF OF CALIFORNIA.

By Prof. GEORGE H. STONE, Mining Engineer.

I spent the winter of 1900-1901 in the Chiricahua Mountains in southeastern Arizona. In December a series of storms began, which lasted till the next May. At first the storms came at intervals of three or four weeks, but gradually they came oftener till March and April, when it snowed and sleeted almost continuously for nearly a month. All these storms were preceded and accompanied by southerly winds.

The winter of 1904-5 I have spent near Arizpe, Sonora, Mexico. There had been almost no rain in this region for three years until last July, when the summer rains were very violent. In November there were one or two very light rains. Early in December we had a more severe rain, which lasted three days. Then the weather was pleasant until early in January, when it rained very violently for several days. Then the